

6.7 Example G: A Cross-Ply Laminate Problem

Sample Input File For A Laminate Problem

The following example is used to explain the control blocks in more detail.

Problem Summary:

Load Type:	Mechanical
Load History:	Monotonic
Load Control:	Stress
Load History Data:	$\dot{\sigma} = 0.01 \text{ ksi/sec}$, $\sigma_{max} = 45. \text{ ksi}$, $\Delta t_{constant} = 1.125 \text{ sec}$
Micromechanics model:	$[\pm 45]_s$ Laminate with Double Periodicity
Fiber Packing Arrangement:	Square Pack at 45% fiber volume ratio
Integration Algorithm:	Forward Euler
Constituent Material Model:	Bodner-Partom
Constituents:	Fiber: Boron (properties input manually) Matrix: Aluminum (properties input manually)

☞ **Note:** This problem is taken from the reference:

Analysis of Metal-Matrix Composite Structures-II. Laminate Analysis,
 Arenburg, R. T. and Reddy, J. N., Computers and Structures, Vol. 40,
 N.6, pp. 1369-1385, 1991.

test of [+45]2s laminate stress control
*PRINT
 NPL=0 %
*LOAD
 LCON=2 LOP=1 LSS=2 %
*MECH
 NPTW=2 TI=0.,4500. LO=0.,45. %
*MODEL
 MOD=3 MATSYS=1 NLY=4 &
 THK=0.25,0.25,0.25,0.25 &
 CON= 2, 2, 2, 2 &
 SYS= 1, 1, 1, 1 &
 ANG=45.,-45.,-45.,45. %
*SOLVER
 NTF=1 NPTS=2 TIM=0.,4500. STP=1.125 %
*FIBER
 NFIBS=1
 NF=1 MS=1 MF=6 NDPT=1 MAT=U IFM=1 &
 EL=58.E3,58.E3,0.20,0.20,24.17E3,6.3E-6,8.28E-6 %
*MATRIX
 NMATX=1
 NM=1 MS=1 MM=1 NDPT=1 MAT=U IFM=1 &
 EL=9.53E3,9.53E3,0.33,0.33,3.58E3,21.06E-6,21.06E-6 &
 VI=1.E4,49.,63.,300.,4.,1. %
*MRVE
 IDP=1,1,1,1
 L=1 VF=0.45 %
 L=2 VF=0.45 %
 L=3 VF=0.45 %
 L=4 VF=0.45 %
*CURVE
 NP=10 %
*MACRO
 NT=1
 NC=1 X=1 Y=7 NAM=apdxg %
*END

The following figure was obtained from the x-y plot data file produced by the present example and for validation was compared to Arenburg and Reddy, Fig. 16, pg. 1382.

